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THE TROUBLE AT UNOCAL — DOES FRED HARTLEY STILL KNOW BEST?

THE AMAZING CAREER OF HARRY SCHREIBER—LIVING IT UP ON OTHER PEOPLE'S MONEY

JUNE 13, 1988

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Forbes

THE D-RAM CRISIS

The U.S. still has a commanding lead in computers and in software —a huge national asset. In the name of protecting the semiconductor industry, we may be giving away this asset. Is this what Americans de policy?

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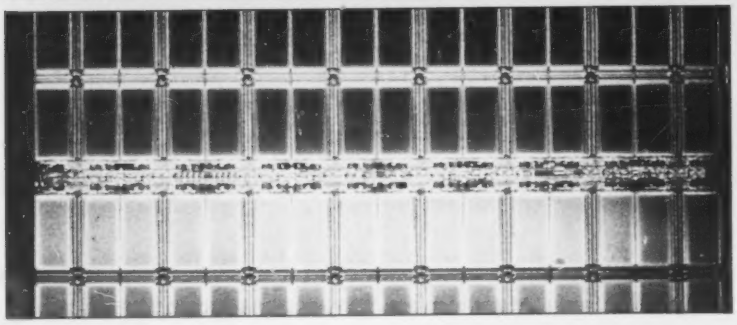

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NUMBER 13

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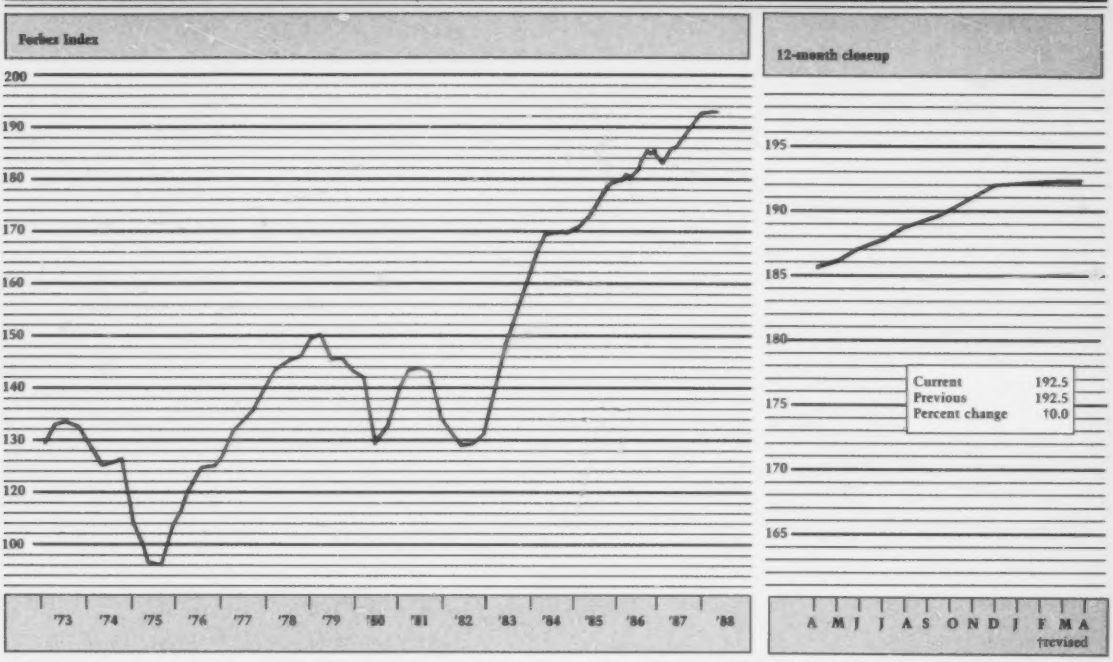
The Forbes Index



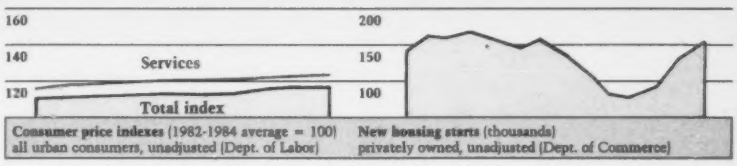
Inflation fears. Consumer prices rose 0.5% in April, to 117.1% of their 1982-84 average. So far this year prices have risen at a 4.5% annual rate, but if the pace of the past two months continues, there is a possibility the inflation rate for 1988 will be around 6%. This was enough to make Wall Street jittery *(see p. 131).* The yield on 30-year Treasurys rose to 9.3%, from an 8.3% low earlier this year.

The economy, however, continues to show uncommon resilience. New unemployment claims fell again in April, to their lowest level since November. Retail sales rose 0.7% from March to April, the sixth straight monthly increase. While first-quarter housing starts were at their lowest level since 1982, April's 15% rise represents a near doubling since December. The Forbes Index was unchanged.

The Forbes Index Components

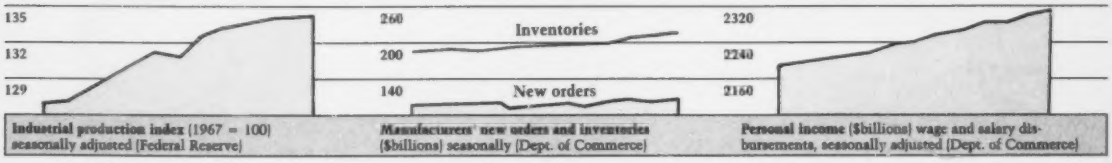
The Forbes Index is a measure of U.S. economic activity composed of eight equally weighted elements: Total industrial production, new claims for unemployment compensation, the cost of services relative to all consumer prices, the level of new orders for durable goods compared with manufacturers' inventories, total retail sales, new housing starts, personal income, total consumer installment credit.

To measure these eight elements, FORBES monitors ten series of U.S. government data. The last 14 months' data for each series are presented at right.



Consumer price indexes (1982-1984 average = 100) all urban consumers, unadjusted (Dept. of Labor)

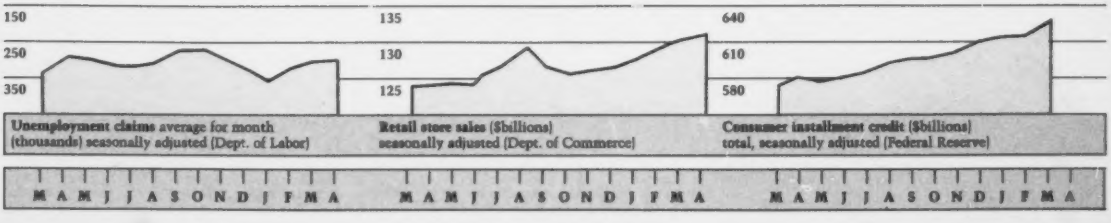
New housing starts (thousands) privately owned, unadjusted (Dept. of Commerce)



Industrial production index (1967 = 100) seasonally adjusted (Federal Reserve)

Manufacturers' new orders and inventories ($billions) seasonally (Dept. of Commerce)

Personal income ($billions) wage and salary disbursements, seasonally adjusted (Dept. of Commerce)



Unemployment claims average for month (thousands) seasonally adjusted (Dept. of Labor)

Retail store sales ($billions) seasonally adjusted (Dept. of Commerce)

Consumer installment credit ($billions) total, seasonally adjusted (Federal Reserve)

In protecting the U.S. semiconductor industry, Washington has dealt a setback to something far more vital to American interests: the imposing U.S. lead in computers and computer software.

How the computer companies lost their memories

By George Gilder

THERE IS A STRONG RUMOR circulating in the computer world that Apple Computer's John Sculley and Sun Microsystems' Scott McNealy may lead several other U.S. computer makers into manufacturing memory microchips. Why does this matter? Because companies like Apple and Sun are brilliant at creating computer systems that use microchips. Making memory chips is a diversion of their talents, a violation of the kind of specialization and focus that have made them spearheads of innovation in the industry. Yet Sculley carefully does not deny the rumor.

No, Apple and Sun have not lost their way. If they go into the memory chip business it will be because making the chips is the only way they can get enough of what they need. There is, right now, a severe shortage of memory chips, brought on at least in part by well-intentioned but misguided trade policy from Washington. Thanks to the shortage, the fastest-growing U.S. computer firms—firms like Sun, Apple and Compaq, to name but a few—are cutting back and shrinking their product lines. As a result, for the first time ever, the Japanese now threaten a major entry into U.S. computer markets.

Semiconductor makers were jubilant when the U.S. and Japan first agreed to a deal in July of 1986 to bring order to the semiconductor markets. But many people in the computer trade objected furiously to the agreement. People like William Gates of Microsoft Corp. complained that higher chip prices would penalize U.S. companies that designed products around the chips. Gates was right, but the problems are worse than predicted. Demonstrating once more the folly of economic engineering, of Caesar failing to render unto Adam what is rightfully Smith's.

IBM and Japan's big computer companies now dominate world production of 1-megabit D-RAM memory chips, sending smaller companies scrambling.

Charts by Andy Christie

The semiconductor in such short supply is a key memory chip called a D-RAM, for dynamic random access memory. D-RAMs are the immediate data storage device found in every computer.

D-RAMs are as vital to computer manufacturers (and to all who depend on computer manufacturers) as steel is to automobile makers or crude oil is to petrochemical producers. You would think that U.S. policy would encourage flat-out production and low prices of an input so vital to our economic future. In fact, however, U.S. policy is heavily to blame for restricting the global supply of D-RAMs.

D-RAMs have dropped in price per bit of information storage (one-eighth of a byte) by more than 99% in the last decade. But the cost of these chips to computer firms is now going up rather than down, at least in the U.S. The price of a memory upgrade from 512K to one megabyte of memory (about enough to store the contents of a large book) has quadrupled since

January, to as much as $350. For the first time in recent history, computer prices in many markets are actually rising rather than continuing down the learning curve as chip functions become denser and cheaper. On May 18, for example, Sun Microsystems added a surcharge of around $250 to the price of add-on memory for its popular workstations.

This setback in cost and supply could hardly come at a worse juncture—when the U.S. may well be widening its lead in the worldwide computer business. Just-in-time manufacturing programs have been widely embraced by the U.S. computer industry. This has enhanced the quality and productivity of U.S. electronics fabrication.

Because of the D-RAM shortage, however, just-in-time manufacturing is now giving way to just-in-case double- and triple-ordering. There is an increasing amount of amnesia systems production—systems without memories.

Worst of all, in an industry where product life cycles are short and the spoils go to the quickest, a number of exciting American computer products have been delayed by the D-RAM shortage.

Item: Apple Computer will not be releasing its long-awaited Macintosh SE upgrade this year. Nor will there be a Macintosh laptop from Apple. And the Macintosh 2's much-touted HyperCard personal database program, its MultiFinder multitasking and its high-resolution color graphics—all dazzling breakthroughs—will be breakthroughs primarily in theory: The Mac 2 has only 1 megabyte of memory, far too little to accommodate more than one of its featured applications.

Item: The advanced functions of Sun Microsystems' new Sun 386i workstation, which, with adequate memory, can simultaneously blaze through both IBM-standard and AT&T Unix-standard programs, will depend on D-RAM availability. And the backlog for the fully equipped Sun 3/60 workstation is four to five months.

Item: Hewlett-Packard's Vectra 386 desktop computer was expected to be unveiled at last month's Comdex show in Atlanta. But it was nowhere to be seen.

Item: Compaq Computer has thrived in the past by beating IBM to the punch with new-generation machines. But a Compaq laptop is conspicuous by its absence.

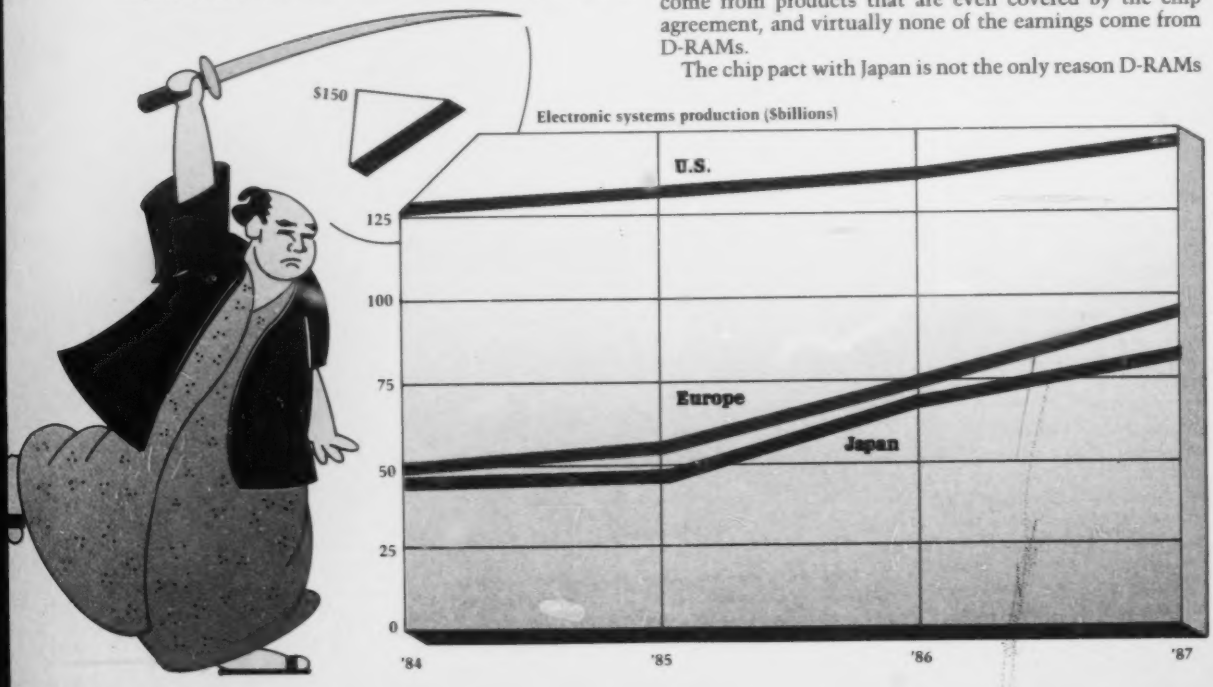
Only mighty IBM emerges unscathed—in fact, stronger—from the D-RAM shortage. Why? Because IBM itself is the world's leading D-RAM producer. Its captive (that is, in-house) D-RAM production was worth over $600 million to $800 million last year; its estimated output of D-RAMs is double Toshiba's. But this does the rest of the U.S. computer industry little good because IBM has a rigid policy of not selling its chips on the open market.

There is no memory chip crunch at the huge Japanese computer firms. There, the cost per bit of memory is still going down. Like IBM, Japan's NEC, Toshiba, Hitachi and Fujitsu make their own D-RAMs and put them in their own products. Unlike IBM, the Japanese companies sell their excess chips to other companies, in Japan and abroad, in competition with U.S. merchant chip companies such as Texas Instruments and Motorola.

How did we arrive at this pass?

Through 1986, D-RAMs were in oversupply. Japanese chipmakers were drowning in chips and dumping them in the U.S. This, naturally, made U.S. merchant chip producers very unhappy. So they went to Washington. Washington listened. A strange alliance developed between U.S. and Japanese bureaucrats. In July 1986, after years of U.S. threats and suits, the Japanese Ministry of International Trade & Industry was hectored into agreeing to a new trade pact with the U.S. At first blush, the agreement is working. By Value Line's reckoning, the major U.S. semiconductor firms rebounded from their 1985-86 slump to earn $633 million, combined, last year. This year Value Line projects the group will earn $1.5 billion, and by the early Nineties over $2.4 billion. Dig deeper, however, and it is apparent that only a small portion of these earnings come from products that are even covered by the chip agreement, and virtually none of the earnings come from D-RAMs.

The chip pact with Japan is not the only reason D-RAMs



are now in short supply. Other factors include an earthquake at a Hitachi factory, low manufacturing yields everywhere in fabricating this fiendishly exacting device and a poorly timed decision by AT&T to withdraw from the D-RAM business just as demand exploded in mid-1987.

But the 1986 chip agreement changed these typical snafus into a systemic crisis. MITI took control over Japanese supplies to prevent Japanese chips from leaking out to gray markets elsewhere in Asia and eventually finding their way to the U.S.

William McClean, the widely respected editor of the semiconductor industry's statistical bible *Status 1988*, notes that early last year there were clear signs that the computer industry was emerging from its 1985-86 slump. Normally, says McClean, the Japanese chipmakers would have expanded production to meet demand. But instead, between August 1986 and August 1987, while demand rose some 30%, MITI administered a 32% reduction in the output of the 256K D-RAM, the then dominant memory chip. Japanese firms cut back investment and shifted efforts from current-generation chips to the next generation. Says McClean: "Not until last November did MITI finally remove its production controls."

Say this for the trade agreement: It worked wonders for the Japanese semiconductor industry. During the mid-1980s the Japanese chipmakers lost some $4 billion as they overexpanded production and dumped the excess in the U.S. But today, as a result of MITI-ordered cutbacks and higher D-RAM prices, Japanese manufacturers are making huge margins on the product and funding big R&D programs designed to close the U.S. lead in state-of-the-art microchips and design tools (FORBES, *Apr. 4*). Just as "voluntary restraints" helped Japan's carmakers by increasing margins and pushing them upmarket, so the chip agreement has made Japan's chipmakers much more formidable long-term competitors.

But the greatest irony here is that the U.S. bailed out Japan's semiconductor industry at precisely the time when Japan's own information sector industrial policies are in disarray. The U.S. has actually been gaining share in the most critical areas of computer, software and telecommunications technology.

Although the Japanese have been targeting information equipment for two decades in all their industrial policies, they have entirely failed to repeat in this domain their earlier successes in shipbuilding, steel, autos and consumer electronics. While the U.S. was losing out in many other industrial products, it was gaining ground in computer software while the Japanese were slipping further behind. This was no mean feat at a time when value-added information technology had shifted rapidly toward software. Moreover, in a new OECD study, economist Lydia Arossa estimates that since 1985 the U.S.' software production has been growing significantly faster than Japan's software production, and now is five times greater than Japan's *(see chart, p. 84)*.

Okay, we're still ahead in software. But in hardware and in semiconductors, surely the Japanese are killing us, aren't they?

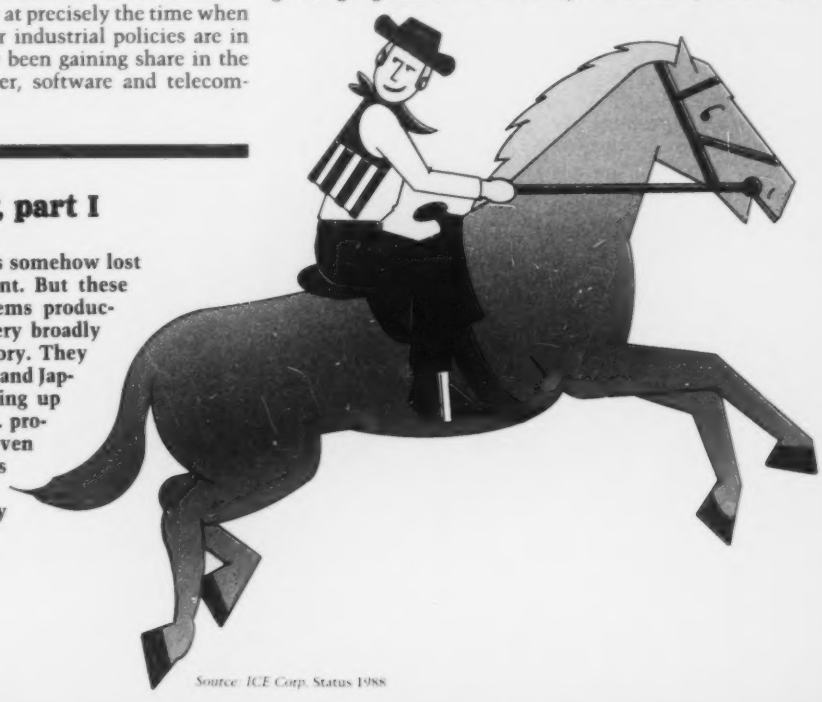
Wrong again. The U.S. global lead in hardware is shrinking slightly, but nevertheless remains impressively large. The chart on the opposite page shows that in 1987 total electronic systems production by U.S. firms was some $143 billion, some two-thirds larger than Japan's. The figures are not firm, but indications are that the U.S. global share in hardware technologies has not fallen significantly since 1982. Considering the ferocious competition, this is a considerable accomplishment.

Even in microchips, perhaps the chief target of Japanese industrial policy, the U.S. has more than held its own. Although the media cite alarming market share estimates, such as a 90% Japanese share of the new generation of D-RAM production, these estimates leave out IBM, by far the world's largest producer of the chips.

What about Intel, a driving force behind the U.S.-Japan chip deal? On the way to a year of 51% growth and barging past the $2 billion barrier in sales, Intel is by far the fastest-growing big firm in the industry. Meanwhile, the 99 U.S.

Myth versus reality, part I

It is often felt that the U.S. has somehow lost its lead in computer equipment. But these lines charting electronic systems production—computer equipment, very broadly defined—present a different story. They show that while the Europeans and Japanese have been slowly catching up during the past two years, U.S. producers still enjoy a large lead, even without adjusting for the effects of the weak dollar. This is cause neither for complacency nor for hand-wringing.



Source: ICE Corp. Status 1988

semiconductor startups launched over the last five years—from Cypress to Actel—constitute the fastest-growing new generation of merchant semiconductor firms in the history of the industry. So much for the U.S. chip industry's needing protection.

Does the U.S. need an industrial policy promoting fewer but larger computer companies capable of taking on the Japanese behemoths? The record to date suggests not. In recent years, innovative U.S. firms have launched and ramped up several entire new product lines—each worth a billion dollars or more in sales.

In engineering workstations, there are Sun and Apollo. In IBM personal computer clones, Tandy, Dell and others. In high-end personal computers, Apple, Compaq and Zenith. In small supercomputers, Convex, Alliant, NCUBE and many new contenders.

And more. In parallel and fault-tolerant systems, Tandem, Stratus and Sequent are the industry leaders. In the face of high skepticism and many misgivings, venture capitalists have funded scores of hard disk drive and disk media firms; this has given the U.S. 80% of the market for hard disk systems.

Unfortunately, the D-RAM crisis now means that most of the smaller American computer companies that have been rapidly winning market share against both Japan and IBM must pay between two and three times as much for their D-RAMs as IBM and the Japanese do. And D-RAMs are no trivial item in a computer's production cost structure. These memory chips represent some 5% of the production cost of a mainframe, 20% for a minicomputer, and up to 50% for a low-end IBM PC clone.

Access to D-RAMs is helping the Japanese win market share in laptops, or portable personal computers. Laptops constitute an increasingly vital arena. As a growing share of the PC market moves toward portables, Japanese strength in this product line may eventually lead to overall dominance in personal computers, roughly analogous to the way they built upon their early successes in cheap, dependable small cars. At present, according to Dataquest figures, the Japanese hold only 7% or 8% of the total personal computer market in the U.S.—but they hold 35% of the laptop business. Include laptop machines manufactured in Japan but sold under Zenith and other U.S. nameplates, and the Japanese actually have 80% of the U.S. laptop market.

Of the American laptop makers, only IBM is a D-RAM manufacturer; all the rest are struggling under the handicap of expensive D-RAMs. IBM, the one U.S. company unaffected by the D-RAM shortage, made exactly the right decisions. Over a three-year period beginning in 1985, while the semiconductor industry collapsed and rival AT&T fled the D-RAM business, IBM boldly invested an estimated $1.5 billion in new memory chip production, designs and facilities. For the first time since 1982, IBM is now in a position to make important advances against its rivals. Derived from its strength in D-RAMs, IBM's edge will last for several years.

Under way in information technology is the emergence of literally scores of new products with memory needs ten times or more greater than previous technologies. IBM's new OS/2 operating system with "Presentation Manager," for example, bids to become the new standard for the industry. But to exploit fully its benefits requires at least 5 megabytes of memory. That's nearly 20 times as much memory as the previous generations of PCs typically needed for their relatively primitive functions.

Less well understood is that all the new imaging and graphics technologies that impel such booming markets as desktop publishing will require still more mountains of memory. At 3 megabytes, the new generation of laser printers, for example, uses 12 times as many D-RAMs as the last generation of entire desktop computer systems. Fax machines use 2 megabytes. Also requiring great memory capacity are all the new local area networks, text scanners, bar code readers and other devices that treat the screen as a map of bits rather than as a set of characters and codes. Beyond these currently available products come such new technologies as artificial intelligence, voice recognition, digital television, digital automobile mapping, diagnostic equipment and high-definition television (FORBES, *May 30*). To get any of these breakthroughs into production will require truly prodigious numbers of memory chips.

Where will the chips come from? Will they be there when needed? Three hopes for the U.S. computer industry will be Micron Technology in Boise, Idaho (FORBES, *Mar. 14, 1983* and *Dec. 31, 1984*); Texas Instruments

Myth versus reality, part II

Contrary to popular impression, the U.S. semiconductor industry—including IBM and other companies with captive chip production—still outproduces Japan's chipmakers. The trend is especially clear when Japanese production is adjusted for the strong yen.

Source: ICE Corp. Status 1988

(which produces its D-RAMs mostly in Japan); and Korea's Samsung Semiconductor (FORBES, *May 16*). Able now to produce 1-megabit chips, Samsung is now in the process of building some 350,000 square feet of new clean rooms—equivalent to some four major new chip fabrication facilities—all devoted to producing D-RAMs.

Micron Technology (1987 sales, $91 million) seems especially promising. A key determinant of costs in D-RAM production is the size of an individual chip, which sets the number of possible devices on each silicon wafer. Since entering the market in 1982, Micron has had the smallest chip in each D-RAM generation. Micron has just launched a "shrink" of its megabit chip down to the size of many competitive 256K devices.

Moreover, it is now rapidly preparing a 1-megabit production process with 40% fewer layers than the competition. If these innovations succeed, Micron may have by far the lowest costs in the industry. Intel, the virtual inventor of the D-RAM, recently agreed to sell Micron chips under the Intel label and obtained warrants to purchase $11.6 million worth of Micron stock.

It is fashionable in some circles to argue that the U.S. computer industry must emulate Japan's, that we need fewer but bigger firms to marshal resources and attack industrial targets from a long-term point of view. Michael Dukakis' Harvard economists are making noises about the need for greater federal intervention to protect U.S. trade and development. Ignored by advocates of industrial policies is the fact that while Japan's industrial policies pushed its fifth-generation computer project, thousands of entrepreneurial U.S. firms left the Japanese in their dust, transforming the world information economy. Meanwhile, a multibillion-dollar government-subsidized D-RAM effort by Europe's Siemens and Philips has yet to produce any significant volume.

While Japanese and European industrial policies founder, U.S. entrepreneurs using new design technologies are generating new computer products at an unprecedented and entirely unexpected pace. We do not need more politicians and bureaucrats urging industrial policy harassment of Japan and Korea and protection of U.S. chipmakers.

Though few congressmen and trade bureaucrats understand the fact, Japanese and Koreans will be part of the memory shortage solution, not part of the problem. Give our entrepreneurs the chips they need, and U.S. leadership seems assured. Industrial policy is just another name for the long-discredited concept of centralized planning. ■

1985

OECD software market ($billions)

1987

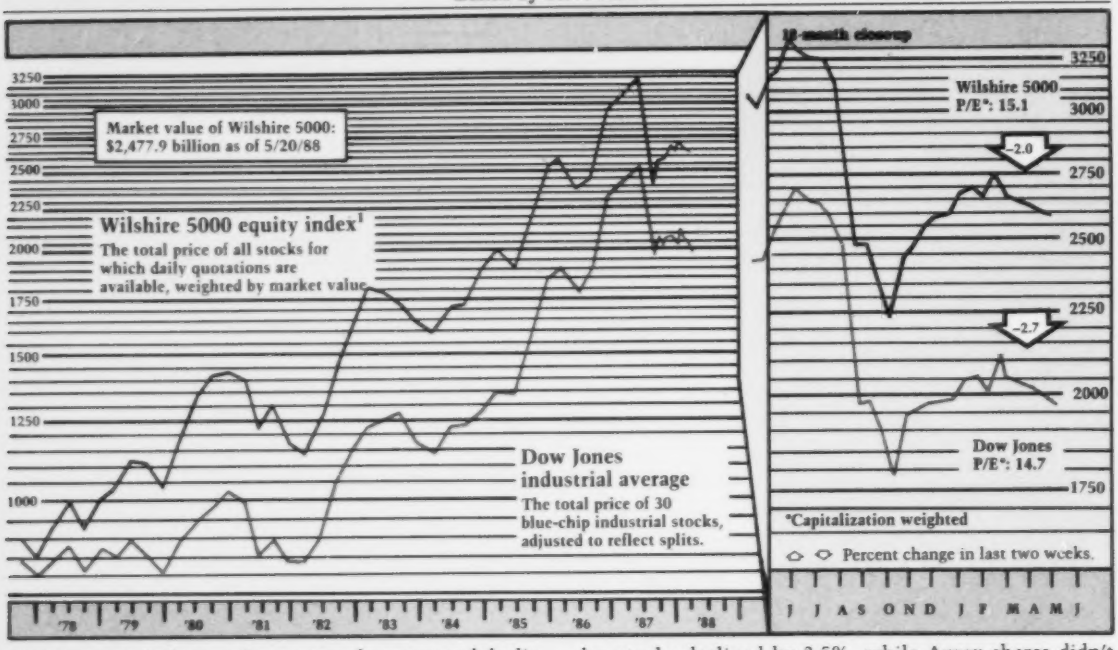
Hard dollars in software

The U.S. has a commanding and, it appears, growing lead in the world's booming software market. Of the estimated $44 billion worth of software produced by the industrial countries last year, U.S.-based producers accounted for nearly $24 billion—a huge absolute amount, and a higher proportion than in 1985.

Source: Datal Aronsi, "Software and Computer Services," OECD Observer.

The Forbes/Wilshire 5000 Review

Edited by Steve Kichen


Market value of Wilshire 5000: $2,477.9 billion as of 5/20/88
Wilshire 5000 equity index[1]
The total price of all stocks for which daily quotations are available, weighted by market value.
Dow Jones industrial average
The total price of 30 blue-chip industrial stocks, adjusted to reflect splits.
12-month closeup
Wilshire 5000 P/E*: 15.1
Dow Jones P/E*: 14.7
-2.0
-2.7
*Capitalization weighted
Percent change in last two weeks.
'78 '79 '80 '81 '82 '83 '84 '85 '86 '87 '88
J J A S O N D J F M A M J

Good news is bad news. Low unemployment and declining trade deficit figures would seem to indicate a healthy economy. Not so, according to stock buyers, who have been hard to please these days. The March trade deficit shrank to $9.75 billion, a three-year low. Wall Street responded by knocking down the Dow 21 and 35 points in successive sessions. The Dow is again trading below the 2000 level. For the two weeks ended May 20, the Dow fell 2.7%, while the broad-based Wilshire index lost 2%. Nasdaq stocks declined by 3.5%, while Amex shares didn't fare much better, with a 3.3% loss.

The yardsticks below indicate the relative strength of tiny companies, outfits with market capitalizations under $17 million. They continue to do better than the big guys. They rose a modest 0.1% during the last four weeks, while companies with over $1 billion in market value fell 2.8%. Over the last 52 weeks the large-capitalization firms lost 4.6%, while the small firms gained 17.5%.

Closeup On the Equity Markets

Performance of six leading indexes

Percent change	Wilshire 5000	Forbes 500[2]	Dow Jones industrials	NYSE Composite	Amex Market Value Index	NASDAQ Composite
in last 4 weeks	–2.5	–2.5	–3.1	–2.5	–2.1	–2.1
in last 52 weeks	–10.0	–10.1	–13.0	–9.9	–9.5	–10.2

Stock performance based on six key investor yardsticks

Percent change	Company size		Volatility[3]		P/E multiple		Dividend yield		Growth profile[4]		Share price	
	large	small	high	low	over 25	under 5	over 7.5%	none	high	low	over $40	under $4
in last 4 weeks	–2.8	0.1	0.9	0.3	–0.9	–0.6	0.4	–0.3	–0.1	–0.5	–2.0	–0.5
in last 52 weeks	–4.6	17.5	14.6	5.3	–4.2	–1.1	–0.1	19.6	13.8	4.9	–0.9	13.3

[1]Wilshire index reflects price performance. It differs slightly from market value of outstanding stocks because of retirements of equity since index was created. [2]Based on sales. [3]A stock's sensitivity to overall market movement. High-volatility issues have wide price fluctuations, low-volatility issues are more stable. [4]A quantitative evaluation of a stock's growth image, determined by Wilshire Associates.

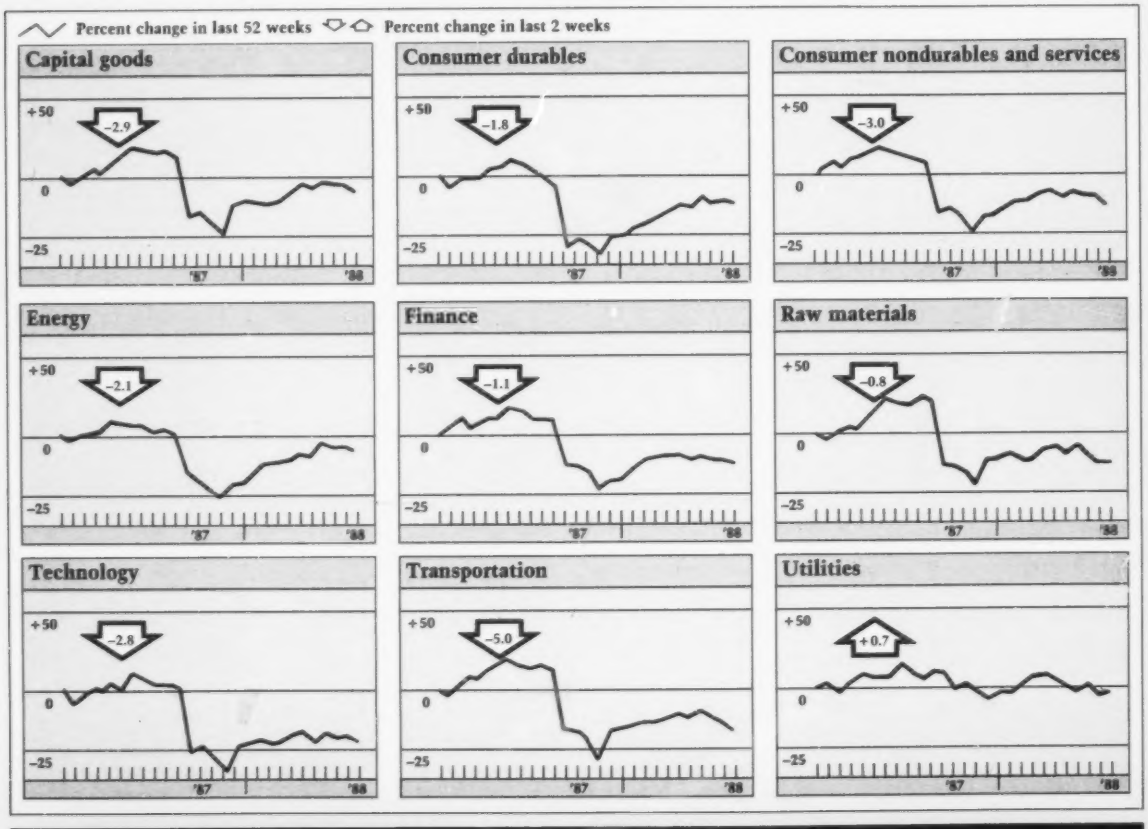
Steven Ramos

Note: All data for periods ending 5/20/88. Prepared by Wilshire Associates, Santa Monica, Calif.

Where the Action Is

The market speaks. Transportation stocks were discarded by portfolio managers worried about this inflation-sensitive group. During the last 52 weeks transportation and technology have been the worst-performing sectors, with losses of 17.2% and 18.4%, respectively.

Wall Street's upside action was focused on dividend-nabbing plays and takeovers. Both Houston Industries and GTE had over 48 million shares traded during the day prior to going ex-dividend. In the last two weeks takeover candidates Murray Ohio, a bicycle maker, and Macmillan gained 46% and 29%, respectively. Robert Bass is interested in acquiring the book publisher. Union Carbide fell 20%: Investors were not pleased with the firm's plans to slash its dividend and offer new stock.



What the Analysts Think

Evolving bargains. Lower stock prices and optimism about 1988 earnings continue to bring down the multiples on estimated 1988 earnings. Consumer durables shows the biggest earnings upgrade, as analysts increased this group's 1988 forecast by 4% over the last two weeks. Ford's 1988 estimate was raised from $8.26 to $9.09.

Forecasting the Forbes Sales 500

Performance period	Average earnings per share	P/E
latest 12 months	$2.65	13.7
1988 estimates	3.54	10.2
1989 estimates	3.92	9.3

Rank based on change in estimate	Sector	Estimated 1988 EPS	Estimated 1988 P/E	% change in 1988 estimate in 2 weeks	% change in 1988 estimate in 4 weeks
1	Consumer durables	$4.30	12.1	4.01%	4.69%
2	Raw materials	2.92	10.2	1.95	3.06
3	Energy	2.90	13.2	1.45	2.47
4	Capital goods	2.57	13.9	0.61	1.16
5	Technology	2.87	11.3	0.37	0.88
6	Finance	3.44	7.6	0.24	-0.24
7	Transportation	2.46	10.3	0.15	0.18
8	Consumer nondurables	2.53	12.3	0.03	-0.02
9	Utilities	2.42	9.5	-0.13	-0.32

Earnings projections are capitalization-weighted consensus estimates from over 2,000 security analysts. Data are compiled and updated continually by the Institutional Brokers Estimate System (IBES), a service of Lynch, Jones & Ryan, a New York-based brokerage firm.

Note: All data for periods ending 5/20/88. Prepared by Wilshire Associates, Santa Monica, Calif., IBES, a service of Lynch, Jones & Ryan, New York.